## Task 1: Review MFM causal reasoning based on direct influences and indirect influences and filling in the following tables.

**Question 1.1**: giving the following MFM patterns, please complete the cause reasoning rules.

Example: Table 1

| IF | Cause can be |
|---|---|
| transport is low-low | *source / storage is low-low* |
| transport is low | *source / storage is low* |
| transport is high | *source / storage is high* |
| transport is high-high | *source / storage is high-high* |

Table 2

| IF | Cause can be |
|---|---|
| source / storage is low-low | transport is high-high |
| source / storage is low | transport is high |
| source / storage is high | transport is low |
| source / storage is high-high | transport is low-low |

**Question 1.2**: giving the following MFM patterns, please complete the reasoning rules.

Table 3

| **IF** | **Cause can be** |
|---|---|
| transport is low-low | sink / storage is high-high |
| transport is low | sink / storage is high |
| transport is high | sink / storage is low |
| transport is high-high | sink / storage is low-low |

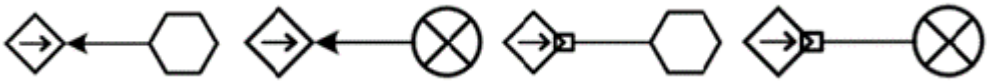
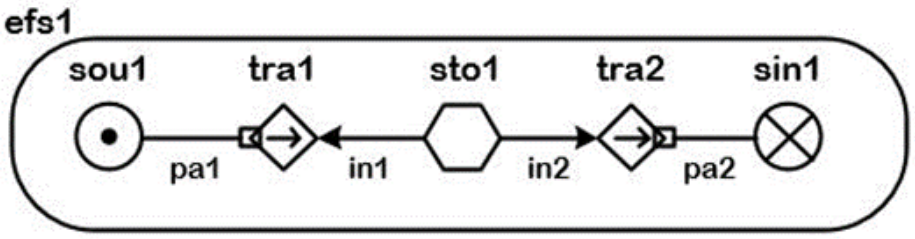


Table 4

| **IF** | **Cause can be** |
|---|---|
| sink / storage is low-low | transport is low-low |
| sink / storage is low | transport is low |
| sink / storage is high | transport is high |
| sink / storage is high-high | transport is high-high |

**Question 2.1** Understand MFM concepts and how they are classified. Observe what type of properties are required for each type of MFM concepts. Compare the graphical representation (symbols) of the model with the JAVA class tree provided above. How would the MFM model of *"efs1"* energy flow be represented in the reasoning system's working memory? Please complete the object list below (Hint: there are four flow functions and two flow relations missing).




**For the flow structure "efs1", objects in the working memory should include:**

### 1. Flow structure

MFMStructure
name == "efs1";
type == MFMStructure.ENERGY; functions == [sou1, tra1, sto1, tra2, sin1];

### 2. Flow functions

MFMFcnAvailable name == "sou1";
type == MFMFcnAvailable.SOURCE;

MFMFcnSpace name == "tra1";
type == MFMFcnSpace.TRANSPORT;

MFMFcnTime name == "sto1";
type == MFMFcnTime.STORAGE;

MFMFcnSpace name == "tra2";
type == MFMFcnSpace.TRANSPORT;

MFMFcnAvailable name == "sin1";
type == MFMFcnAvailable.SINK;

### 3. Flow relations

MFMRelFlow
name == "pa1";
start == sou1;
end == tra1;
direction == MFMRelFlow.UPSTREAM;
type == MFMRelFlow.PARTICIPATE;
Start() == sou1;
End() == tra1;

MFMRelFlow
name == "in1";
start == sto1;
end == tra1;
direction == MFMRelFlow.DOWNSTREAM;
type == MFMRelFlow.INFLUENCE;
Start() == tra1;
End() == sto1;

MFMRelFlow
name == "in2";
start == sto1;
end == tra2;
direction == MFMRelFlow.UPSTREAM;
type == MFMRelFlow.INFLUENCE;
Start() == sto1;
End() == tra2;

MFMRelFlow
name == pa2";
start == sin1;
end == tra2;
direction == MFMRelFlow.DOWNSTREAM;
type == MFMRelFlow.PARTICIPATE;
Start() == tra2;
End() == sin1;